The Monte Carlo Simulation (MCS) has been widely adopted in the literature as an uncertainty analysis, as it can assess complex systems that can vary in different ways given their parameters. Using MCS the synthetic effect of all the model parameters can be assessed by sampling inside realistic probability distributions (Chen et al 2011). In this research, we use a similar methodology as described in previous literature for spatially explicit uncertainty analysis for criteria weights (Friezadeh et al 2014). We wished to explore the spatially explicit uncertainty of the model output based on the error propagation of the input data.

The first step was to generate a random point dataset from our original area where the uncertainty would be calculated. We chose to select 50 points randomly from the area with a uniform distribution to get as many layer combination values as possible. The criteria weights calculated before were used as the reference values of weights for the MCS. A uniform probability distribution was allocated to each criterion weight with a 20% uncertainty in each direction associated with it. A MCS was performed at each point of our randomly selected dataset with 10,000 iterations sampling from the probability distribution of each weight in every run. The output of the MCS at each point was a histogram of potential model output values. Analyzing the results, we produced statistics of the minimum, maximum and average values and the standard deviation of each point. The next step was to map those statistics to get the spatial distribution in our area of interest. Instead of mapping the absolute value of the results we decided to map a normalized value based on all the assessed points to get an even comparison between the different metrics. The results of the spatially explicit MCS are shown in Figure X.

